



CAUSES & IMPACTS OF DENTAL INFECTIONS IN CHILDREN

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ABSTRACT

Dental infections and their related diseases are a prevalent problem; this research paper aims to thoroughly examine the causes of dental infections from a biological perspective and analyze the impacts of dental infections on our overall health. Dental infections are known to be caused by a certain type of bacteria that thrives in our mouth under specific circumstances. There are diverse conditions that the invasion of this bacteria can result in, such as dental plaque or tartar. Knowing the specific causes of bacterial invasion is also a key prevention method for the conditions that are aforementioned. This paper also emphasizes the importance of proper oral treatments and examines the consequences of having inappropriate oral hygiene habits. In addition, by mentioning the associated health problems of dental infections, ranging from mild to severe, this paper dives deep into pediatric dentistry.

KEYWORDS: Streptococcus mutans, Oral hygiene, Gum disease, Tooth decay, Tooth abscess, Dental infections

INTRODUCTION

Dental infections have long been a significant concern among children, with approximately 40% of children aged 2 to 11 experiencing dental problems. The effects of tooth decay can range from mild discomfort to severe complications, including spontaneous pain during teeth use, high fever, and accelerated heart rates caused by the spread of abscesses. If left untreated, abscesses can pose life-threatening risks to children. It is widely known that humans have two sets of teeth, with the first set naturally falling out between the ages of 6 and 8. Once all primary teeth are replaced by permanent teeth, children must maintain them with utmost care. Moreover, dental infections in primary teeth can have long-term consequences, impacting the development of permanent teeth. Recognizing the gravity of childhood dental infections as a public health issue, the American Dental Association (ADA) emphasizes the importance of understanding the underlying causes of tooth decay and implementing preventive measures from an early age. This research article aims to investigate the causes and impacts of dental infections in children, shedding light on the urgent need for effective prevention and treatment strategies.

Literature Review

A research article published by Barira Islam, Shahper N Khan, Asad U Khan thoroughly examines the role of *Streptococcus mutans* in spreading dental infections from a strictly biological perspective as well as methods to prevent bacterial infections. Asad U Khan is a professor who has authored over 256 research articles. In addition, the *Journal of Dental Research* (JDR), which is a comprehensive scientific journal that includes clinical research in the dental or oral sciences, is a resourceful journal that facilitates the gathering of detailed information regarding dental cavities. This website is also a member of the Committee of Publication Ethics (COPE), which is an organization dedicated to supporting publishers and research institutes. A research article called *The Primary Tooth Decay Prevention Program in Children: Application of Intervention Mapping Approach* published by Bahareh Kabiri, Alireza Heidarnia, Mehdi Mirzaei Alavijeh, and Mohammad Esmael Motlagh also helped enhance the understanding of tooth decay prevention particularly for children.

Discussion

1. Streptococcus mutans

Dental infections are usually caused by *Streptococcus mutans*, a type of bacteria that can easily build up on the surface of our teeth and spread via saliva in the presence of fermentable carbohydrates such as glucose (Lemos et al., 2019). *Streptococcus mutans* are more likely to spread infections to an unaffected person, especially children. The mechanism behind spreading infections is simply splitting the sugar that is contained in the food and using it as an adhesive material to stick to the surface of our teeth. The formation of this additional layer on the surface of our teeth is called dental plaque, which is a sticky substance that coats our teeth. Dental plaque can be simply defined as an example of a biofilm, which is a layer of the microbial body that can grow on a surface (Chandki et al., 2011). Dental plaque is made of particles of the food we consume, saliva, and bacteria (Loesche, 1996). Although dental plaque can be easily removed by continuous flossing or brushing teeth with fluoride toothpaste, children might easily neglect these problems by overlooking the importance of keeping oral hygiene. When these problems are left unnoticed, tartar, or a dental plaque that has become hard on our teeth, forms on the surface of our teeth. Since tartar

contains minerals that are also contained in saliva, removing it requires professional treatment from dental hygienists. While professional care will help the patients get rid of tartar, tartar that builds together with the gum line might lead to serious health problems.

2. The Gum Line

The gum line is where our teeth meet the gum, or the area in our mouth that surrounds the base of our teeth. When tartar builds up on this particular area, an infection called gingivitis appears, which eventually leads us to the very beginning of gum disease. Gum disease is a condition in which the soft tissue around our teeth is damaged and our teeth are no longer supported by the bones, increasing the risk of losing our teeth (Hersh, 2019). Gum disease somewhat compromises our cardiovascular system and increases the amount of cholesterol in our bloodstream, leading to an insufficient flow of blood into our bloodstream. This can often lead to an increased risk of heart disease, diabetes, or blood cancer (Liccardo et al., 2019). Along with its impact on the risk of heart disease, gum disease can lead to an unusual blood sugar level in our body, and increase the risk of diabetes or blood cancer (Liccardo et al., 2019). These potential risks are stemmed from neglecting one's oral hygiene; especially children who are not fully aware of proper oral care or underestimate the impacts of neglecting oral hygiene due to the new set of teeth that will grow out afterward. Consequentially, they are in a vulnerable position to contracting dental infections.

Having the basic concept of how dental infections are carried by *Streptococcus mutans*, knowing the specific routes that the bacteria can get through our body, or the causes behind tooth decay is significant. Although it may seem obvious, having an unhealthy diet is one of the main causes of tooth decay. As aforementioned, *streptococcus mutans* is a bacterium that spreads rapidly in the presence of fermentable carbohydrates (Lemos et al., 2019). Therefore, unhealthy diets that contain high amounts of sugary products that can be broken down and produce acids can have severe consequences on our teeth health. Since 50% of our daily food consumption must come from carbohydrates, it is almost impossible to avoid the impacts they will have on our teeth. Furthermore, drinking soft drinks such as soda contributes to tooth decay, as the acid from the liquids attacks our tooth enamel (Cheng et al., 2009). Tooth enamel, which is a protective outer layer that protects the teeth, being attacked will directly result in tooth decay.

3. Enamel Erosion

Enamel erosion, caused by overexposure to acids, will lead to a lack of minerals that cause the protective layer to be dilapidated (Bahal & Djemal, 2014). Moreover, enamel cannot recover from damage once it starts deteriorating. Regardless of all these consequences, having the correct oral hygiene habits will prevent us from having dental infections. Proper oral hygiene steps include brushing our teeth twice a day for two or more minutes with fluoride toothpaste and flossing to eliminate leftover food in between the tight spaces of our teeth. Despite the well-known importance of oral hygiene habits, children have a higher chance of not following them properly, and thus a higher risk of having dental infections. In addition to these causes, xerostomia, or simply dry mouth, also causes tooth decay. Xerostomia is a condition in which our mouth does not produce enough saliva and leads to dehydration, especially in stressful situations, increasing the risk of dental infections (Villa et al., 2014). This condition causes tooth decay since saliva plays a pivotal role in washing away

leftover food in our mouth, and the lack of saliva would simply put a stop to this function. While increasing the chance of tooth decay, dry mouth might have other effects that can severely harm our health, such as difficulty in speaking or chewing and swallowing food.

Tooth decay, although it is a serious problem, is associated with many health problems. The most common impact is aching pain when chewing food, or even when the teeth are unused. Tooth decay simply makes our teeth have a higher sensitivity and makes the stimulus more pronounced. Moreover, more complications such as tooth abscesses might be caused due to tooth decay. A tooth abscess is a pocket of pus that forms inside the teeth or gums by bacterial infections. There are three types of tooth abscess: gingival, periodontal, and periapical (Yousefi et al., 2022). While gingival abscess is an abscess that only occurs in the gums, periodontal abscess occurs in the area between our teeth and gums and is often associated with periodontal diseases. Since periodontal abscess causes sharp and immediate pain to patients, it is considered one of the most frequent dental emergencies. When left untreated, a periodontal abscess might lead to tooth loss or even sepsis, which is a life-threatening condition in which our body shows extreme responses to infections and leads to inflammation. A periapical abscess occurs in the root of our teeth when bacteria invade the pulp, and it might spread to our jaw, and in severe cases, it might invade the soft tissues of our neck or face (Huang, 2011).

Conclusion

Dental infections, especially for children, are a significant problem and should be treated with care by parents and professionals in the field. This research paper thoroughly examined the causes of dental infections from a biological perspective and explained the prevalent problems that might occur in pediatric dentistry in detail. As mentioned throughout the paper, proper treatments for dental infections are significant, and neglecting the problems can lead to severe health conditions even at an early age. Especially for children who are not aware of the significance of maintaining oral hygiene, integrative efforts from dental healthcare professionals and families are significant. Although most dental problems are not lethal if treated properly and readily, even the worst situations are inevitable when they are left untreated. Therefore, in order to avoid dental problems, children have to be open to learning the consequences of dental infections and prevention methods.

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